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**Recent studies on  
Myrtle's silverspot butterfly  
at the Tule Elk Range and vicinity  
(Point Reyes National Seashore)**

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## Summary

This report summarizes work completed in 1997 on Myrtle's silverspot butterfly at Point Reyes National Seashore (PRNS). As in 1996, our 1997 studies targeted the Myrtle's silverspot butterfly population in the Tule Elk Range. This population was again observed to straddle the southern boundary fenceline.

Both putative populations of this subspecies residing at the Seashore remained at comparatively low levels in 1997. The population centered at the Tule Elk Range consisted of approximately the same number of individuals as in 1996 (approximately 250 to 500 adult butterflies), while the population located in central Point Reyes (including North Beach) appeared to have declined further (to 50 to 200 adult butterflies).

The general distribution of both populations of Myrtle's silverspot butterflies at PRNS has been fairly consistent since the start of our studies in 1992; Myrtle's silverspot butterflies have been observed annually at North Beach and along the southern portion of the Tule Elk Range. The butterflies were not observed at South Beach, along Drake's Estero, or in the burn area in 1997.

Grazing by livestock may be having a strong impact on the distribution and persistence of Myrtle's silverspot butterflies. The area immediately adjacent to the Tule Elk Range, in particular, appeared to have been overgrazed significantly in 1997. While a few butterflies were observed in these largely denuded areas, the level of grazing likely eliminated the possibility of butterflies successfully locating suitable numbers of the larval hostplants.

Myrtle's silverspot butterfly (*Speyeria zerene myrtleae*) is listed as an endangered species under the federal Endangered Species Act. As such, protection of existing populations of this species is mandated by law, particularly when populations reside on federal lands. This report discusses field work completed in 1997, summarizes the results of work completed from 1992 to 1996, and sets forth conclusions and recommendations for Myrtle's silverspot butterfly management at the Tule Elk Range and vicinity, and throughout PRNS.

Field activities in 1997 focused on monitoring the distribution and relative abundance of Myrtle's silverspot butterflies inhabiting the Tule Elk Range and the continuation of Seashore-wide surveys to assess overall distribution and abundance at PRNS. The Seashore-wide surveys are necessary in order to place observations from the Tule Elk Range into proper context. Portions of 58 person-days were spent at PRNS during the 1997 Myrtle's silverspot butterfly's flight season in order to address these issues.

### **Studies focused on the Tule Elk Range Population**

In the summers of 1996 and 1997, the population of Myrtle's silverspot butterfly at the Tule Elk Range (Tomaes Point) was studied. The presence of Myrtle's silverspot butterfly at the Tule Elk Range was noted in prior studies during 1992 to 1995, but little was known concerning the population. Recent studies were designed to monitor the distribution and abundance of butterflies in the elk range and complement ongoing studies focused on the tule elk. Due to the status of Myrtle's silverspot butterfly as an endangered species, any data from this study may have implications for planning activities involving the tule elk.

### **Methods**

In order to determine the distribution and relative abundance of Myrtle's

silverspot butterfly inhabiting the Tule Elk Range and the immediate vicinity, the 14 one-kilometer transects designated in 1996 were walked during 1997 (Map 1). Transects were walked on five occasions during July and early August following methods described by Pollard and others (Hall 1981, New 1991, Pollard 1982, Pollard and Yates 1993, Pollard et al. 1986, Thomas 1983). Portions of these transects were also walked repeatedly in late June and early July, prior to the appearance of adult butterflies. These transects spanned most of the Tule Elk Range, as well as agricultural/pasture areas immediately south of the fenceline. These transects consist of fixed start and end points as well as an approximate route (the exact path walked varied over two to three meters between sampling days). All transects were walked at a constant rate, approximately 20 minutes per one-kilometer transect. Butterflies observed within five meters beside, above, or in front of the person walking the transect were counted as being in the transect. Butterflies observed behind the person walking the transect or farther than five meters away were noted, but not included in the total for the transect.

### Results and Discussion

In 1997, the adult Myrtle's silverspot butterfly flight season started in early July, with possibly a few individuals being present in late June. Peak numbers of butterflies were observed in late July, and few individuals were seen beyond mid-August. The 1997 flight season was shifted approximately three weeks earlier in the summer than the 1996 season (the 1996 season had been unusually late).

Myrtle's silverspot butterflies were found scattered across much of the Tule Elk Range, but most individuals were located in the southeastern portion of the range. A total of 61 butterflies were counted during the transect walks (Table 1). Another 14 butterflies were observed in association with the transects, but were outside of the "counting" zone. The number of butterflies observed varied greatly among transects (ranging from 0 to 21), but the overall distribution of butterflies was fairly consistent from

day to day.

There were some slight spatial shifts in the distribution of the butterfly population from 1996 to 1997 (Table 2). In three transects, the relative number of butterflies increased by at least five percent compared to 1996 (transects 1 south, 2 south, 1 north). In three others, the relative number of butterflies decreased (again, as evidenced by an at least 5% change in relative abundance) from 1996 to 1997 (transects 2, 3, and 2 north). Given our current level of knowledge concerning the butterfly, slight shifts such as those noted during this study are difficult to interpret -- multiple hypotheses can be formulated to address such shifts, but few can be rejected. It is possible that those shifts were in response to winter weather (slight changes in larval mortality across slopes with different microclimates), summer weather (wind patterns or the overall drier conditions in 1997), grazing levels, or changes in plant communities -- to mention a few possible factors. Our best guess is that shifts on the order of those observed from 1996 to 1997 occur frequently, and are the result of short-term phenomena (mainly weather).

While precise estimates of population numbers are difficult to determine (see Van Strien et al. 1997 and aforementioned articles by Pollard), these data suggest a slight increase in the total number of Myrtle's silverspot butterflies in the Tomales Point area in 1997. However, due to extensive habitat degradation of areas outside of the Tule Elk Range (to be discussed later), the apparent minor increase in number of butterflies observed along the transects might have been the result of butterflies avoiding the overgrazed areas and being concentrated in the less impacted areas within the Tule Elk Range. Overall, the total number of adult Myrtle's silverspot butterflies present in the area in 1997 was likely between 250 and 500 individuals -- essentially the same number as were present in 1996.

As was found in 1996, upwards of one third of the area supporting this population may be outside of the Tule Elk Range. On the basis of numerous, albeit casual,

observations, the area south of the Tule Elk Range supported fairly good amounts of vegetation in 1996, and Myrtle's silverspot butterflies were frequently observed there. In 1997, however, much of the area was essentially devoid of vegetation, and Myrtle's silverspot butterflies were present in very low densities (again, as observed while conducting our transect walks and during numerous general visits to the area). This apparent decline in amount of vegetation in the area could have been the result of drier weather or cattle grazing, or more likely, a combination of the two -- even with grazing intensity (number of livestock head per unit time or area) kept constant from 1996 to 1997, the drier weather would have resulted in less production in the area, and subsequently more impact by the livestock.

One of the suggestions resulting from our 1996 study concerned the possibility of a source-sink type situation. Under such a scenario, butterflies originating from areas within the Tule Elk Range would disperse into the adjacent agricultural/pasture areas while searching for nectar sources, but would not reproduce in those locations. Areas outside of the Tule Elk Range might be utilized by the butterfly, but local population persistence would be primarily dependent on areas supporting *Viola* within the range. In 1996 we felt that the areas outside of the Elk Range were sufficiently similar to other areas known to support Myrtle's silverspot butterflies, and that a source-sink situation was unlikely. However, given the present status of the cattle-grazed habitat, we feel that some type of source-sink is occurring, at least during some years. Our best summation of the situation is that silverspot butterfly reproduction outside of the Tule Elk Range does occur during some years, notably when livestock grazing and plant production are in reasonable balance. In other years, butterfly reproduction is probably limited to areas within the Tule Elk Range. If this is true then areas inside the Tule Elk Range need to be considered critical for the long-term persistence of Myrtle's silverspot butterfly at PRNS.

These observations have several conservation implications. We still support our

previous contention that with the Myrtle's silverspot butterfly population inhabiting lands on both sides of the Tule Elk Range boundary fence, some leeway can be given to potentially problematic land-use issues, including tule elk population growth and grazing by cattle. Since the butterfly population straddles multiple land-uses, it is possible that this population is somewhat buffered from detrimental effects of any one type of land-use. This "buffering" was probably in effect in 1997 as much of the cattle range likely did not support larval butterflies. Without a substantial portion of the population inhabiting the Tule Elk Range, the population would have experienced a significant decline in 1997. It should also be noted that there are often time lags before impacts manifest themselves, and a decline may not be evident until 1998.

In any event, it is likely that a Myrtle's silverspot butterfly population will continue to persist in the vicinity of the Tule Elk Range through the foreseeable future. The butterfly population may expand into the cattle-grazed areas when grazing intensities allow for sufficient numbers of larval host plants to survive and decline when grazing is too intense. Because the population occupies a fairly diverse mix of plant communities and land-uses, the butterflies should always be able to find some suitable habitat. Habitat damage due to excessive numbers of elk is still a real concern, but given the overall condition of the Tule Elk Range, there appears to be a reasonable amount of time before such a concern becomes a pressing issue. (The recently constructed elk exclosures should help determine the impacts of elk on vegetation, and should go a long way in determining impacts of elk on the butterfly.) On the other hand, cattle grazing in the area does not appear to be managed properly; this is an issue that needs to be more fully addressed in the near future.

### **General Surveys of Point Reyes National Seashore**

General surveys of Point Reyes National Seashore were conducted in 1997 to monitor the overall distribution and abundance of Myrtle's silverspot butterfly.

Distribution data allow for comparisons with similar data from 1996 and previous years, which shows whether the ranges of the populations are expanding, contracting, or remaining constant.

### Methods

Based on previous knowledge of the distribution of Myrtle's silverspot butterfly at PRNS, surveys were conducted throughout PRNS in 1997. Special attention was given to those areas that have been found to contain suitable habitat in years past but have never been shown to support this butterfly. Surveys consisted of walking through areas, noting general floral composition, and looking for Myrtle's silverspot butterflies. Portions of 20 person-days were spent conducting these surveys throughout the season.

### Results and Discussion

Most of the central and northern portions of the Seashore were visited at least twice during the adult butterfly flight season. During these surveys, five butterflies were observed at North Beach and one butterfly was observed in the vicinity of Kehoe Ranch. No Myrtle's silverspot butterflies were seen in any of the other areas surveyed, including Drake's Beach, Bull Point, Abbott's Lagoon, South Beach, Heart's Desire Beach, the Coast Guard facility (and access road), and the burn area.

The observation from Kehoe Ranch and in the agricultural/pasture fields immediately south of the Tule Elk Range, continues to indicate that the population "centered" at the Tule Elk Range covers a fairly broad area.

Observations of the butterfly at North Beach and vicinity were surprisingly sparse. Myrtle's silverspot butterflies were still present in central Point Reyes in summer 1997, but at levels lower than had been recorded previously. A gross population estimate for the area, for 1997, based solely on comparisons with data from previous years (for which we have rough population estimates), is 50 to 200 adult



butterflies.

## Conclusions and Recommendations

Several conclusions from recent studies of Myrtle's silverspot butterfly at Point Reyes National Seashore have bearing on conservation planning -- both at the Tule Elk Range and for Myrtle's silverspot butterfly in general.

- Population trends of Myrtle's silverspot butterfly at PRNS in 1997.

Tule Elk Range and vicinity -- This population either remained at the same level as 1996 or experienced a slight increase in 1997. The number of butterflies, however, is still lower than levels recorded earlier this decade.

Central PRNS -- This population appeared to decline in number from 1996 to 1997, and is much lower than the population levels recorded earlier this decade.

- Estimated number of adult Myrtle's silverspot butterflies in summer 1997. (While it is difficult to derive precise estimates of population size, comparisons between observations made in 1997 and observations made during previous years, both at PRNS and elsewhere, can be used with confidence to estimate range of population size.)

Tule Elk Range and vicinity population: We estimate that between 250 and 500 adult Myrtle's silverspot butterflies were present in this population in 1997.

Central PRNS: We estimate that only between 50 and 200 adult Myrtle's silverspot butterflies were present in central PRNS in 1997.

- Impacts of grazing. -- The areas immediately south of the Tule Elk Range appeared to have been significantly overgrazed in 1997. We acknowledge that this is a subjective

evaluation in that no measurements concerning the vegetation were taken. However, given the extensive areas of bare dirt and the obvious changes in vegetation from 1996 to 1997 we feel that it is not too much of a stretch to conclude that the intensity of cattle grazing was too high in 1997.

In order to conclusively determine the effects of grazing on Myrtle's silverspot butterfly, further studies need to be conducted which include an experimental component. Such studies will require several treatments and will likely take several years to complete. These experiments need to investigate the effects of different types of herbivores (cattle, sheep, tule elk), intensity of grazing, and timing of grazing practices, on the larval host plant (*Viola adunca*) and adult nectar sources.

- Non-native plant species, particularly ice plant, continue to be problematic in central PRNS. Ice plant appears to have recovered from the hard frost of a few winters ago, and is crowding out many of the native wildflowers. We consider these wildflowers to be a resource critical to Myrtle's silverspot butterflies. Some effort to control the ice plant should be developed and initiated in the near future.

- Future work

Distribution of hostplants -- "Quick" surveys in the agricultural/pasture areas, particularly in those areas adjacent to the Tule Elk Range, for *Viola adunca* and wildflowers which potentially provide nectar to adult butterflies would help determine if there is a source-sink phenomenon occurring (if there are no violets in areas outside the Tule Elk Range, then Myrtle's silverspot butterfly is not reproducing in these areas). Such surveys would also further address the many questions associated with grazing. As *Viola adunca* is a winter-spring flowering species, surveys would need to occur outside of the typical Myrtle's silverspot butterfly field season.

Continued monitoring -- Some continued monitoring of the distribution and gross abundance of adult Myrtle's silverspot butterfly in the Tule Elk Range and adjacent areas is advisable. If Myrtle's silverspot butterfly continues to use the agricultural/pasture lands, and violets are found in these areas (and it can be shown or at least implied that reproduction is occurring in these areas) then some of the time pressure on determining an appropriate conservation strategy for the tule elk and Tule Elk Range is eliminated.

Development of a Seashore-wide conservation plan -- In the long run, conservation planning for the butterfly needs to be Seashore-wide -- not just focused at the Tule Elk Range or North Beach or the burn area. The development of a long-term, science-based, multiple species conservation plan would benefit the butterfly and many other species of conservation concern inhabiting PRNS. While PRNS is already doing a fine job protecting the resources present, there are a number of problems, including non-native species and overgrazing, that threaten some elements of the park's rich diversity.

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## **Appendix**

### Summary of previous work on Myrtle's silverspot butterfly at Point Reyes National Seashore

The following summaries are included in this report to provide a framework in which the 1997 results should be viewed.

#### **1992**

Initial activities at PRNS focused on documenting the gross distribution of Myrtle's silverspot butterflies in the reserve, and on the design and testing of a long-term monitoring plan. During the summer of 1992 CCB staff biologists visited PRNS on 22 calendar days, totaling some 56 person-days on site.

Butterflies were observed in two regions -- a broad area extending from the coastal dunes and scrub, from North Beach to South Beach, east through the grasslands and scrub to the bluffs on either side of Drake's Estero, and in the Tule Elk Range, particularly in White Gulch. Transects for use in a long-term monitoring project were also designated at North Beach, South Beach, and in the bluffs near Drake's Beach.

#### **1993**

Field activities in 1993 focused on a mark-recapture of Myrtle's silverspot butterflies at North Beach. During the summer of 1993 CCB staff biologists visited PRNS on 18 calendar days, totaling some 37 person-days on site. Seventy-six Myrtle's silverspot butterflies were individually marked during the study, and 24 recaptures were recorded. The 76 marked individuals included 38 of each sex. Estimates for the number of butterflies at least visiting the North Beach site range from 250 to 750 individuals, though the relatively small number of adult recaptures precluded a more

precise estimate. This was not taken as an estimate of overall Myrtle's silverspot butterfly population size in central Point Reyes since we were unable to effectively sample many portions of the area. A rough estimate of the total number of Myrtle's silverspot butterflies at Point Reyes National Seashore in 1993 was low 1000s for the central PRNS population and mid-100s for the Tule Elk Range population.

Based on condition at first capture, butterflies appeared to have begun emerging from pupae at Point Reyes during the last week of June 1993. Individual butterflies continued to emerge until early August. Given the two to five week "lifespan" of adults, adult butterflies were likely present at Point Reyes until mid-September 1993. As is typical of many butterfly species, the timing of the male and female butterfly flight seasons differed. In 1993 adult male butterflies reached peak abundance at the end of July, while adult female butterflies did not reach peak abundance until seven to ten days later.

General surveys of PRNS indicated that the overall distribution of butterflies did not change from 1992 to 1993, although there appeared to be somewhat fewer butterflies at South Beach in 1993.

## 1994

Again, field studies centered on a mark-recapture at North Beach and Drake's Estero. After some 50 butterflies were marked, with no recaptures, this study was deemed an inefficient use of time and halted. We then expanded our general surveys of PRNS in an effort to clarify overall distribution at the Seashore. The general surveys indicated that the number of individual Myrtle's silverspot butterflies and their distribution were similar to those recorded in 1992 and 1993.

Also initiated during the summer of 1994 was a project designed to provide preliminary information on the impacts of grazing on Myrtle's silverspot butterflies, on its larval hostplant (*Viola adunca*), and on plant species that potentially provide nectar.

Portions of this work was conducted by Ian Woods, as one of the requirements for the Stanford University undergraduate honors program (Woods 1995). Field activities for this study occurred at PRNS and at the Marin Coast Property.

## 1995

From mid-June to September 1995, PRNS was visited on 25 calendar days, with some 55 person-days spent on site. Unfortunately, 1995 proved to be a very bad year for Myrtle's silverspot butterflies at PRNS -- only between 44 and 56 individual butterflies were observed. Given the effort spent looking for butterflies and the generally good summer weather conditions, this low number of observations undoubtedly indicates a large decrease in number of adult Myrtle's silverspot butterflies at PRNS in 1995 when compared to the previous three years.

In 1995, Myrtle's silverspot butterflies were observed in only three areas at PRNS -- areas where moderately high densities of butterflies had been observed in previous years. These included the back-dune scrub interface at North Beach, the bluffs on either side of the Drake's Beach visitor's center, and White Gulch in the Tule Elk Range at Tomales Point. Since these locations are a subset of areas previously found to support Myrtle's silverspot butterflies, our overall view of the spatial extent of the butterfly populations at PRNS did not change -- butterflies at the Tule Elk Range are probably isolated spatially from butterflies in central PRNS, while the butterflies observed at North Beach and along Drake's Beach are part of a single population (as in previous years, individuals at North Beach were observed flying east, towards the estero). Clearly within central Point Reyes there are areas where different densities of Myrtle's silverspot butterflies may be found, but given the vagility of the butterflies and their apparent flight patterns, we still believe that the butterflies at North Beach and those at Drake's Estero freely intermingle during most years.

It is likely that the decline of Myrtle's silverspot butterflies at PRNS was part of a



regional decline in late-spring and summer-flying butterflies. As noted by our group and by Dr. Arthur Shapiro (U. C. Davis), numbers of late-spring and summer-flying butterflies were much lower in 1995 than in recent years. These observations imply that there were region-wide factors controlling butterfly abundance, with the most probable factor in central California being negative population response in the face of deluge.

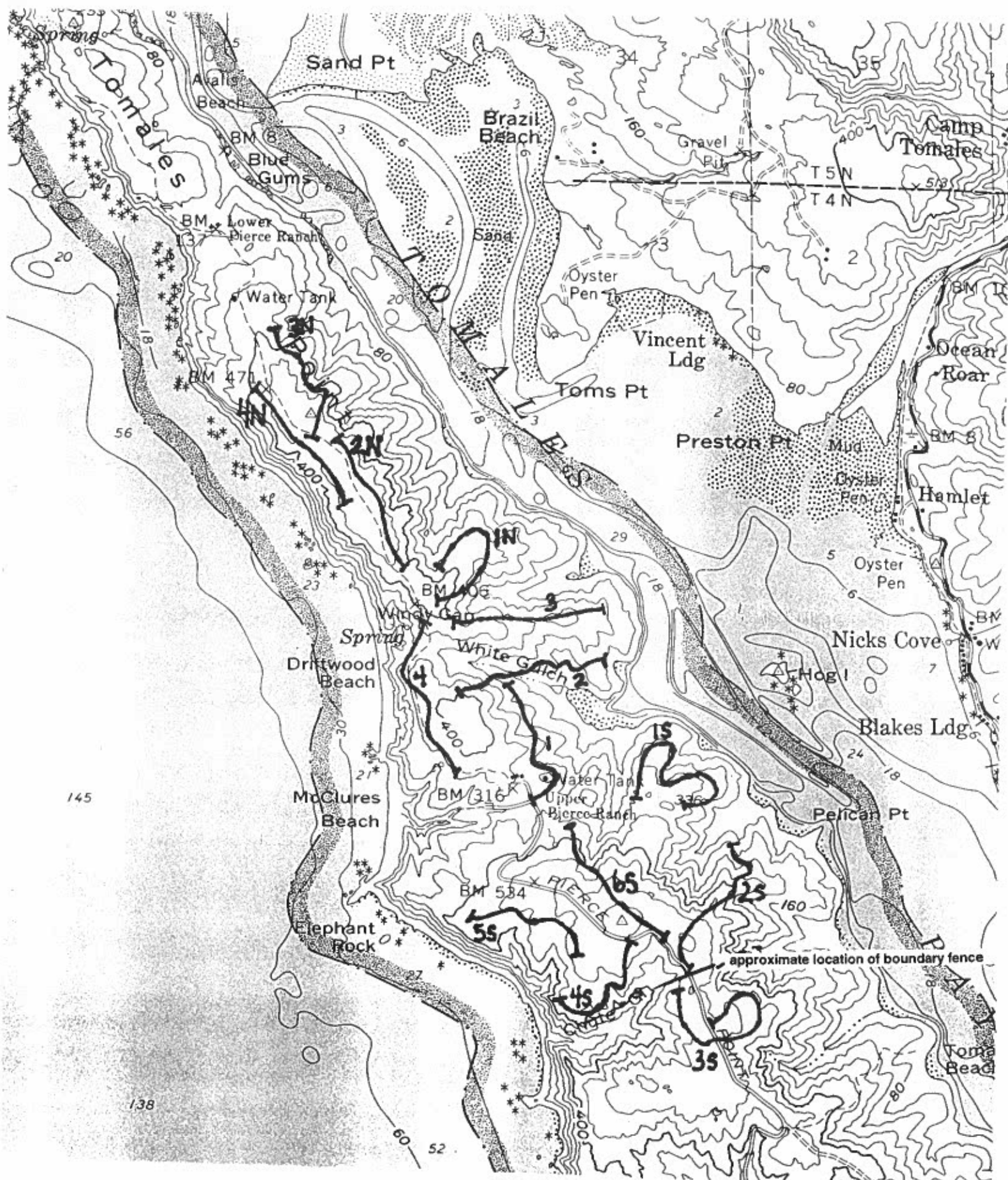
There are several possible causes for the postulated decline. These include: an alteration of the distribution or abundance of organisms predatory on Myrtle's silverspot butterflies (such as ants, spiders, or shrews); a delay in larval development to the extent that many larvae went into diapause for a second time (as apparently happens in other species of *Speyeria*); an unusual application of biocide by local ranchers or park staff members (*Speyeria* are apparently extremely susceptible to biocides, and if any biocides were applied in an atypical manner due to the weather, or if unusual amounts of biocides washed into areas supporting butterfly larvae, widespread butterfly mortality could have resulted); shifts in local land use (including the timing and intensity of grazing); or long-term habitat degradation (such habitat degradation could be accelerated or made more apparent during high rain years -- much degradation is due to non-native species which often do very well under rainy conditions -- conversely, droughts often help sustain native species in many grassland systems). While these alternatives are possible, the simplest explanation is that the decline was the result of increased larval or pupal mortality caused by the unusually heavy winter/spring rains.

## 1996

During the summer of 1996, field studies targeted the butterfly population present in the Tule Elk Range. Fourteen one-kilometer transects were established within the Tule Elk Range and the immediate vicinity. Transects were successfully walked on five occasions during August and a total of 34 Myrtle's silverspot butterflies were observed. Most individuals were located in the southern portion of the Tule Elk Range and outside

of the range in the agricultural/pasture areas immediately south of the fenceline. Based on the 1996 observations, the population in the Elk Range was estimated to be in the low 100's.

Additional areas were also searched to determine the overall distribution of Myrtle's silverspot butterfly throughout PRNS. Visits to South Beach, North Beach, and Drake's Beach yielded five butterflies, while no individuals were located at Bull Point, Abbott's Lagoon, Heart's Desire Beach, or the Coast Guard facility. The mark-recapture study at North Beach was aborted mid-season due to a relatively low rate of capture. The 1996 adult flight season was relatively late, with the season beginning in late July and peaking in early to mid-August.



Map 1. Tule Elk Range Transects

**Table 1**

Number of Myrtle's silverspot butterflies observed along Tule Elk Range transects in 1997

| Transect         | Date       |         |         |         | 8/7-8/11/97 |         | TOTAL<br>(inside only) | percentage of<br>total |
|------------------|------------|---------|---------|---------|-------------|---------|------------------------|------------------------|
|                  | 7/7-7/8/97 |         | 7/10/97 |         | 8/4/97      |         |                        |                        |
|                  | inside     | outside | inside  | outside | inside      | outside |                        |                        |
| 1                | 0          | 0       | 0       | 0       | 1           | 0       | 2                      | 3%                     |
| 2                | 0          | 0       | 0       | 0       | 1           | 0       | 1                      | 2%                     |
| 3                | 0          | 0       | 0       | 0       | 0           | 0       | 1                      | 2%                     |
| 4                | 0          | 0       | 0       | 0       | 0           | 0       | 2                      | 3%                     |
| 1 south          | 2          | 1       | 4       | 0       | 1           | 1       | 21                     | 34%                    |
| 2 south          | 3          | 1       | 3       | 0       | 5           | 0       | 16                     | 26%                    |
| 3 south          | 2          | 0       | 0       | 0       | 7           | 0       | 3                      | 5%                     |
| 4 south          | 1          | 0       | 0       | 1       | 0           | 1       | 6                      | 10%                    |
| 5 south          | 0          | 0       | 0       | 0       | 2           | 0       | 0                      | 0%                     |
| 6 south          | 0          | 0       | 0       | 0       | 0           | 0       | 0                      | 0%                     |
| 1 north          | 2          | 0       | 1       | 0       | 0           | 0       | 8                      | 13%                    |
| 2 north          | 0          | 0       | 0       | 0       | 1           | 0       | 0                      | 0%                     |
| 3 north          | 0          | 0       | 0       | 0       | 0           | 0       | 1                      | 2%                     |
| 4 north          | 0          | 0       | 0       | 0       | 0           | 0       | 0                      | 0%                     |
| Total per survey | 10         | 2       | 8       | 3       | 18          | 1       | 61                     |                        |

inside = # butterflies observed within counting zone

outside = # butterflies observed associated with transect, but outside of official zone

**Table 2** Change in distribution of Myrtle's silverspot butterflies  
in the Tule Elk Range

| <b>Transect #</b>         | <b>1996</b> | <b>1997</b> | <b>change</b> |
|---------------------------|-------------|-------------|---------------|
| 1                         | 3%          | 3%          | no change     |
| 2                         | 18%         | 2%          | decrease      |
| 3                         | 21%         | 2%          | decrease      |
| 4                         | 0%          | 3%          | no change     |
| 1 south                   | 12%         | 34%         | increase      |
| 2 south                   | 15%         | 26%         | increase      |
| 3 south                   | 9%          | 5%          | no change     |
| 4 south                   | 6%          | 10%         | no change     |
| 5 south                   | 0%          | 0%          | no change     |
| 6 south                   | 0%          | 0%          | no change     |
| 1 north                   | 0%          | 13%         | increase      |
| 2 north                   | 9%          | 0%          | decrease      |
| 3 north                   | 6%          | 2%          | no change     |
| 4 north                   | 3%          | 0%          | no change     |
| <b>Total observations</b> | <b>34</b>   | <b>61</b>   |               |

change was deemed significant if greater than 5%